Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matters of	)	
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Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service	)	IB Docket No. 17-95
	)	
Facilitating the Communications of Earth Stations in Motion with Non-Geostationary Orbit Space Stations	)	IB Docket No. 18-315

To: The Commission

REPLY AND SUR-REPLY COMMENTS OF THE BOEING COMPANY

The Boeing Company ("Boeing") herein submits reply comments in the Commission's proceeding addressing the use of earth stations in motion ("ESIMs") with geostationary satellite orbit ("GSO") networks and sur-reply comments on the related proceeding addressing the use of ESIMs with non-GSO ("NGSO") systems. Nearly every party that filed comments in each of these proceedings supported allowing the use of ESIMs in every frequency band that is available for GSO and NGSO fixed satellite service ("FSS") operations. This is because, as the Commission has acknowledged, in each FSS frequency band in which ESIMs are authorized, the reception of signals by ESIMs and their return transmissions to satellites "should not introduce a material change to the interference environment created or to the protection required."[1]

[1] Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service, *Report and Order and Further Notice of Proposed Rulemaking*, IB Docket No. 17-95, FCC 18-138, ¶ 91 (Sept. 27, 2018) ("*Order*" or "*FNPRM*").

Boeing files these reply and sur-reply comments to address two issues: the ongoing concern expressed by the National Academy of Sciences ("CORF") and the Fixed Wireless Communications Coalition ("FWCC") regarding the interference conditions related to ESIM receive operations in certain frequency bands, and the ongoing efforts of EchoStar Satellite Operating Corporation and Hughes Network Systems, LLC ("EchoStar") to disrupt the settled regulatory status of GSO and NGSO satellite systems in the lone frequency band where NGSO systems have priority.

I. ESIMS SHOULD BE PERMITTED TO RECEIVE SIGNALS IN ADDITIONAL FREQUENCY BANDS WITHOUT IMPOSING ANY ADDITIONAL MEASURES TO PROTECT THE EARTH EXPLORATION SATELLITE SERVICE OR THE FIXED SERVICE

CORF continues to express concern that the reception of pre-existing GSO FSS satellite signals by ESIMs in the 10.7-10.95, 17.8-18.3, 18.8-19.3, and 19.6-19.7 GHz bands could result in additional interference to earth exploration satellite service ("EESS") systems operating in adjacent frequencies. CORF advocates for more stringent out-of-band emissions ("OOBE") limits for GSO FSS satellite signals that would be received by ESIMs using the 10.7-10.95 GHz band.[2] CORF also suggests that the Commission prohibit the reception of satellite signals by ESIMs in the bottom 25 MHz portion of the 10.7-10.95 GHz band in order to create a guard band to further protect scientific monitoring by EESS systems.[3]

These arguments continue to disregard the fact that the reception of existing satellite signals by ESIMs cannot generate any additional interference to other services in the same or adjacent

[2] Comments of the National Academy of Sciences' Committee on Radio Frequencies, IB Docket No. 17-95, at 8 (Apr. 8, 2019) ("*CORF Comments*").

[3] *See id.* at 9.

frequencies. CORF appears to believe that the use of these frequencies by ESIMs may prompt satellite operators to launch additional GSO FSS satellites to increase capacity. This concern should be dismissed as it disregards the fact that, as previously explained by Boeing and echoed by the Commission, the number of GSO FSS satellites in operation is limited by the Commission's 2 degree spacing rules and therefore cannot be increased appreciably above current levels.[4] Further, the satellite industry could not implement more stringent OOBE limits in the foreseeable future because the satellites that would be used to communicate with ESIM devices have already been launched and their technical characteristics cannot be altered.

The Commission should also disregard the concerns expressed by the FWCC regarding the spectrum sharing environment between ESIMs and fixed service ("FS") networks in the 10.7-10.95, 11.2-11.45, 19.3-19.4, and 19.6-19.7 GHz bands.[5] FWCC argues that it would not be feasible for FS networks to protect downlink transmissions to ESIMs in the identified Ku- and Ka-band frequencies from harmful interference. Such protection, however, was not proposed in the *FNPRM* nor sought by ESIM operators. Instead, as explained by Boeing and others, ESIMs already employ sufficient measures to successfully avoid interference from FS networks. For example, if an ESIM terminal receives interference from an FS network, the ESIM operator can switch to a different receive frequency or a different satellite. Further, because ESIMs are in motion, any interference from FS networks will be exceedingly brief. Therefore, no additional Commission action is needed in this regard.

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[4] *Order*, ¶ 63.

[5] Comments of the Fixed Wireless Communications Coalition, IB Docket No. 17-95, at 1 (Apr. 8, 2019).

II. THE COMMISSION SHOULD REJECT ECHOSTAR'S ARGUMENTS REGARDING THE PROTECTION OF SECONDARY GSO FSS OPERATIONS IN THE 18.8-19.3 GHZ AND 28.6-29.1 GHZ BANDS

In its comments in the Commission's two ESIM proceedings, Boeing expressed support for permitting ESIMs to communicate with both NGSO FSS systems and GSO FSS networks in the paired 18.8-19.3 GHz and 28.6-29.1 GHz bands, in each case matching the regulatory status of the underlying satellite service, *i.e.*, on a primary basis with NGSO FSS systems and on a secondary basis with GSO FSS satellite networks. Boeing believes that such operations could complement each other by providing very robust coverage and throughput to end users using a combination of both NGSO and GSO satellites.

Other parties, particularly operators of GSO FSS networks, identified no interference concerns with the operation of ESIMs with primary NGSO FSS systems and secondary GSO FSS networks in this spectrum. Inmarsat, for example, explained that "[t]echniques for managing interference between FSS systems are well understood" and the "introduction of ESIMs into FSS spectrum does not materially change these interference scenarios."[6] ViaSat concurred with Inmarsat's position, asserting that "[i]t is well-established that ESIMs can perform within the same technical envelope as fixed earth stations through highly accurate antenna pointing mechanisms and compliance with appropriate power limits" and "[t]herefore, in the 18.8-19.3 GHz and 28.6-29.1 GHz bands, where the Commission has determined that the GSO FSS successfully can operate on a secondary basis to the NGSO FSS, adding ESIMs would not change this conclusion."[7]

In stark contrast, EchoStar continues to argue that "technical support in the record" is needed before it can be concluded that GSO FSS networks can operate successfully on a secondary

[6] Comments of Inmarsat, IB Docket No. 17-95, at 3 (Apr. 8, 2019).

[7] Comments to Further Notice of Viasat, Inc., IB Docket No. 19-75, at 3 (Apr. 8, 2019).

basis in these frequencies in the presence of NGSO FSS transmissions with ESIMs.[8] The underlying nature of secondary operations, however, is that the secondary user is *not* ensured protection from primary service providers. Therefore, if EchoStar is unconvinced that its network can operate successfully on a secondary basis in the 18.8-19.3 GHz and 28.6-29.1 GHz bands, then EchoStar should refrain from using this spectrum.

Clearly, there is no basis for the Commission to alter the regulatory status between NGSO and GSO FSS systems in the 18.8-19.3 GHz and 28.6-29.1 GHz bands or to delay authorizing ESIMs to operate with NGSO FSS systems in this spectrum. The priority of NGSO FSS systems in these frequencies is critical to their growth and operation. As SES/O3b explained, "investments and decisions with respect to NGSO systems have been made in reliance on current rules, including the designation of frequencies where NGSO systems have primary status vis-à-vis GSO operations."[9] Further, the ability for NGSO FSS systems to operate with ESIMs is essential to the business development plans for NGSO FSS systems. As explained by Telesat, this is because "[d]emand for mobile aeronautical, maritime and land services is one of the key drivers of the burgeoning NGSO demand for this spectrum."[10]

It would also be exceedingly inequitable to alter the regulatory status between NGSO and GSO FSS systems in the 18.8-19.3 GHz and 28.6-29.1 GHz bands. As SES/O3b further explained, "there is ample spectrum in which NGSO operations are prohibited from causing

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[8] *See* Letter from Jennifer A. Manner, Senior Vice President, Regulatory Affairs, to Marlene H. Dortch, Secretary, Federal Communications Commission, IB Docket No. 18-315, at 2 (Apr. 19, 2019) ("*EchoStar Letter*").

[9] Reply Comments of SES Americom, Inc. and O3b Limited, IB Docket No. 18-315, at 4 (March 13, 2019) ("*SES/O3b Reply Comments*").

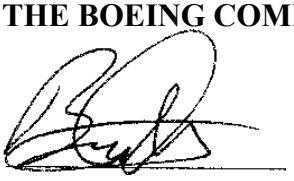
[10] Reply Comments of Telesat Canada, IB Docket No. 18-315, at 3 (March 13, 2019).

unacceptable interference to GSO operations, including the 11.7-12.2 GHz (space-to- Earth); 14.0-14.5 GHz (Earth-to-space); 18.3-18.6 GHz (space-to-Earth); 19.7-20.2 GHz (space-to-Earth); 28.35-28.6 GHz (Earth-to-space); and 29.5-30.0 GHz (Earth-to-space) frequency bands."[11] GSO FSS operators are already permitted to communicate with ESIMs in many of these frequencies.

Therefore, in order to facilitate the further growth and development of NGSO FSS systems, and to promote a level competitive field between NGSO and GSO FSS operators, the Commission should immediately authorize NGSO FSS systems to operate with ESIMs in the 18.8-19.3 GHz and 28.6-29.1 GHz bands. The Commission should also again reject the arguments of EchoStar that NGSO FSS operators providing services through ESIMs should be relegated into a subordinate status to EchoStar's operations in these frequencies.

Respectfully submitted,

THE BOEING COMPANY

By: 

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[11] *SES/O3B Reply Comments* at 4.